

SECTION 02738

PIPE LINING FOR WATER MAINS

PART 1 GENERAL

1.1 DESCRIPTION

- A. Work covered under this section includes furnishing all labor, materials, transportation, and equipment necessary for the lining of water mains, by means of the installation of Polyester Reinforced Polyethylene (PRP) for the rehabilitation of existing water mains. The work includes furnishing all labor, tools and equipment required to perform pipe lining operation, and installing the required equipment at the locations indicated on the drawings.

1.2 DEFINITIONS

- A. Pipe lining is a patented method and the pipe lining contractor must be licensed. Pipe lining is a method of rehabilitating water mains by installing a Polyester Reinforced Polyethylene (PRP) liner inside an existing water main. The lining is formed by the insertion of a folded, flexible PRP into the host conduit. The PRP is re-rounded using steam and air pressure. The finished product is a jointless liner that is formed to the existing pipe.
- B. Host conduit is defined as the existing water main which is to be lined by lining methods. The host conduits vary in size.
- C. Liner is defined as the new lining material to be installed by pipe lining which rehabilitates the host conduit.

1.3 QUALITY ASSURANCE

- A. The contractor shall be certified by the Pipe Lining System Manufacturer that such firm is a licensed installer of their system.
- B. The contractor shall also warrant that the equipment used on this Contract, where covered by patents or license agreements is furnished in accordance with such agreements and that the prices included herein cover all applicable royalties and fees in accordance with such license agreements. The Contractor shall defend, indemnify and hold the Government harmless from and against any and all costs, loss, damage or expense arising out of or in any way connected with any claim of infringement of patent, trademark or violation of license agreement.
- C. The liner manufacturer shall be designated at the time of the bid. Any subsequent change of liner manufacturer must be approved in writing by the Contracting Officer or designated representative. A record of experience and product information shall be provided by the Contractor at the time of the bid.
- D. The Contractor must have successfully completed 5,000 feet of water main pipe lining.

1.4 SUBMITTALS

- A. The Contractor shall submit the required data in accordance with Division 1. Submittals shall include, but are not limited to, the following:
 - 1. Qualifications of Pipe Lining Contractor. The Qualifications of the Pipe Lining Contractor shall be submitted. These Qualifications shall include detailed descriptions of the following:
 - a. Name, business and email address and telephone number of the Pipe Lining Contractor.
 - b. Name(s) of key personnel to be directly involved with Pipe Lining for this project.
 - c. List of jobs, footage, job description, and contact information for projects used to meet the 5,000 ft. minimum experience requirement.
 - d. The Contractor shall sign and date the information provided and certify that to the extent of his knowledge, the information is true and accurate, and that the supervisory personnel for the pipe lining method will be directly involved with and used on this project. Substitutions of personnel and/or methods will not be allowed without written authorization of the Contracting Officer.
 - 2. Construction Procedures
 - a. The Contractor shall submit written descriptions of the construction method(s) and equipment to be used, pit dimensions, and location required for equipment and material access.
- B. Submit for review complete working drawings showing details of the proposed method of construction and the sequence of operations to be performed during construction. Show the method of pipe lining including the pipe lining system to be used, location of working shafts, including method of excavation, shoring and bracing, and dewatering techniques that are proposed to be used.

PART 2 PRODUCTS

2.1 MATERIALS

- A. PRP shall be designed to withstand internal working pressures of 150 psi (minimum), independent of the structural capacity of the host pipe.
- B. Prior to construction, Contractor shall submit for approval, the manufacturer's specific technical data with complete information on physical properties of liner, and liner dimensions pertinent to this job. A certificate of "Compliance with Specification" shall be furnished for all materials to be supplied.
- C. PRP system shall have been used for a minimum of 5 years in the lining of potable water mains.
- D. PRP shall be manufactured and fabricated under quality control conditions set by the manufacturer as governed under ISO 9000.

- E. PRP Tube shall consist of a jacket made from polyester fiber woven into a cylindrical form and encapsulated in polyethylene. Encapsulation implies the individual fibers of the polyester tube are surrounded by polyethylene.
- F. Size PRP to provide a snug fit against the internal circumference of the existing water main, span the actual field distance between the beginning and ending points with extra allowances as needed for stretching and shrinkage due to installation, pressure or expansion.
- G. When installed the PRP system shall be suitable for the conveyance of potable water and shall comply with the requirements of ANSI/NSF Standard 61 as evidenced by Certification from NSF International or other approved body approved by the USEPA.

PART 3 EXECUTION

3.1 PREPARATION

- A. The Contractor shall provide temporary bypassing service as required in Division 1 to perform the work.
- B. Conduct operations in accordance with applicable OSHA standards, including safety requirements involving work in excavations and confined spaces. Make suitable precautions to eliminate hazards to personnel near construction activities when pressurized air and / or steam is being used.

3.2 PRE-INSTALLATION CLEANING AND INSPECTION

- A. Internal corrosion products, debris, and other obstructions revealed by inspection shall be removed from the water main to the extent necessary for PRP installation. Pipes shall be cleaned, as needed, with high-pressure water jet cleaners, mechanically powered equipment, winch cable attached devices or fluid-propelled pig devices.
- B. Perform inspection of the water main immediately before installation of the PRP. Inspection shall be performed by experienced personnel trained in locating obstructions by use of a CCTV survey.
- C. If inspection reveals an obstruction that cannot be removed by conventional cleaning equipment or a branch or tee connection which is to be restored to service, then an access pit shall be constructed to uncover and remove the suspect section of pipe to facilitate installation of the PRP and / or reinstatement of the branch or tee connection.

3.3 ACCESS PITS

- A. The location and number of access pits shall be proposed by the contractor and approved by the Government prior to excavation. The pits shall be located such that their number shall be minimized.
- B. Before any excavation is done for any purpose, the contractor shall contact the various utility companies for determining field location of existing utilities.
- C. The contractor shall be responsible for the removal of all valves, branches, fire hydrant connections and other fittings and their replacement / renewal as necessary after lining.

3.4 INSTALLATION PROCEDURES

A. Installation of PRP

1. The existing pipe shall be dewatered and free of incoming water. If water is present, measures shall be taken to minimize the possibility of trapping water between the PRP and the existing pipe.
2. The PRP shall be installed through an appropriate pipe opening by means of hand or winch pulling.

B. Inflation and Steam Forming

1. The PRP shall be inflated using either compressed breathing air or medical grade nitrogen.
2. The PRP shall be formed by softening and pressurizing with steam. Steam forming shall apply sufficient heat and pressure to completely erase the folded memory of the PRP and create a tight fit to the host pipe.

C. Cooling

1. Adequate breathing air or nitrogen pressure shall be maintained continuously during the cooling process to ensure a tight fit shall be established between the PRP and the host pipe after pressure is removed.

D. Finished PRP

1. The finished PRP shall be continuous and free from visual defects such as foreign inclusions, pinholes, twists and blistering. Defects that will cause operational problems shall be corrected by the Contractor in a mutually acceptable manner and without cost to the Government. Finished PRP shall also meet field hydrostatic test requirements.

3.5 END SEALS

- A. After the PRP is cool, the PRP shall be cut to appropriate length to allow fitting of End Seals. End Seals shall be Redman or WASK Transgrip® Pipe End Coupler, or approved equal. End Seals shall also comply with the requirements of ANSI/NSF Standard 61 as evidenced by Certification from NSF International or other approved body approved by the USEPA.
- B. End Seals shall maintain a leakproof seal at 150psi.
- D. End Seals shall seal the host pipe to prevent the migration of debris between the host pipe and the PRP but allow any water in the annular space between the host pipe and PRP to be expelled by system or hydrostatic pressure.

3.6 SERVICE CONNECTIONS

Service reconnections to the lined pipe shall be made by local excavation and fitting of an

Angus “Ferrule Adapter”, or approved equal.

3.7 FIELD HYDROSTATIC TESTS

Verify system integrity by subjecting the mains to 150 psi hydrostatic test pressure.

3.8 CLEAN UP

Upon completion of the pipe lining operations, the Contractor shall restore all areas disturbed by these operations to conditions existing prior to construction. Minimum requirements have been set forth in the drawings and specifications as far as pavement thickness and vegetation.

END OF SECTION